Consortium

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Max-Planck-Institut für biologische Kybernetik

http://www.kyb.mpg.de

Project coordination and management, development of novel human-machine interfaces for steering and navigation of PAVs.

The University of Liverpool

http://www.flightlab.liv.ac.uk

Modelling of PAV concepts, exploring and defining flying qualities, and development of an efficient paradigm to train people for flying PAVs.

École Polytechnique Fédérale de Lausanne

http://www.epfl.ch

Development of control strategies for collision avoidance, formation flying, automation algorithms for determining landing spots, and automatic take-off and landing.

Eidgenössische Technische Hochschule Zürich

http://www.asl.ethz.ch

Development of control strategies for automatic take-off, navigation and landing of PAVs.

Karlsruher Institut für Technologie

http://www.itas.fzk.de

Investigation of the socio-technological context, the infrastructural environment, the potential impact on society and social expectations towards PAVs via reflexive analysis.

Deutsches Zentrum für Luft- und Raumfahrt

http://www.dlr.de/flugsystemtechnik

Evaluation of newly developed technologies using the Flying Helicopter Simulator, and support on the development of dynamic models and Highway-in-the-Sky displays.

Project data

myCopter

Enabling Technologies for Personal Aerial Transportation Systems

Collaborative project, nr. 266470

EU Programme FP7-AAT-2010-RTD-1

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mycopter

http://www.mycopter.eu

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* Photo by Buck Engineering and Consulting GmbH

SEVENTH FRAMEWORK PROGRAMME

mycopter

http://www.mycopter.eu

An envisioned personal aerial vehicle © Flight Stability and Control

Max-Planck-Institut für biologische Kybernetik

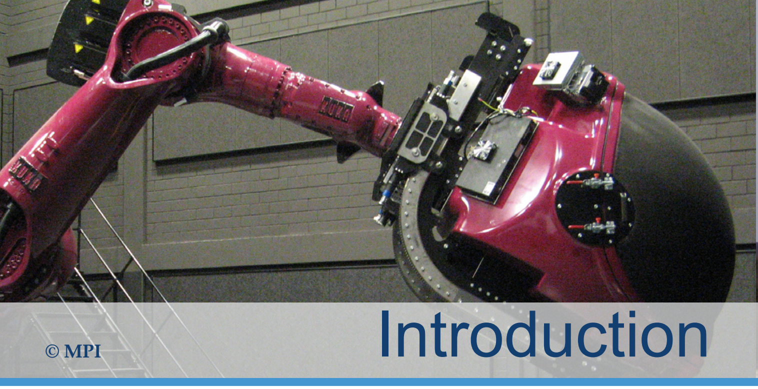
ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

Karlsruhe Institute of Technology

DLR

ETH Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

UNIVERSITY OF LIVERPOOL



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Introduction

myCopter

Enabling Technologies for Personal Aerial Transportation Systems

Prevailing congestion problems with ground-based transportation and the anticipated growth of traffic present a major challenge in developing solutions that combine the best of ground-based and air-based transportation. The optimal solution could include the creation of a personal aerial transportation system (PATS) that can overcome the problems associated with current modes of transport.

We propose an **integrated approach to enable a viable PATS** based on Personal Aerial Vehicles (PAVs) envisioned for daily work and leisure commutes, flying at low altitudes in urban environments. Such PAVs are likely to be autonomous to a high degree without requiring conventional air traffic control.

Our consortium consists of expert partners that will address the development of advanced technologies necessary for a viable PATS, as well as perform socio-technological evaluations to assess the impact of a PATS on society. To this end, dynamic models for potential PAVs will be designed and implemented on motion simulators and a manned helicopter. An investigation into the required flight competencies of PAV users will be conducted, which will guide a user-centric design of suitable human-machine interfaces. Furthermore, the project will introduce new automation technologies for obstacle avoidance, path planning and formation flying. This project is a **unique integration of social investigations and technological advancements** that are necessary to move personal transportation into the third dimension.

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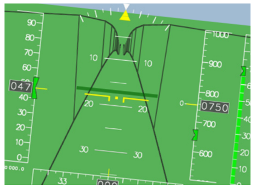

An envisioned human-machine interface

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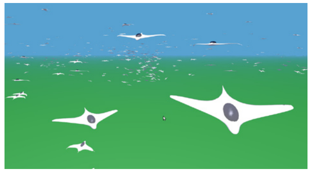
Objectives



Simulation of a swarm of vehicles

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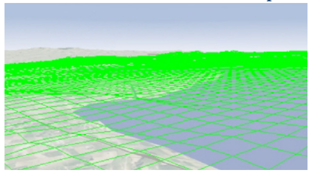

Computer vision algorithms for terrain detection

Goals

- **Human-aircraft interaction, including training issues:** PAVs are expected to shift the role of users from traditional flight control to flight management. Therefore, it is essential for human-machine interfaces to incorporate perceptual sensitivities and motor capabilities of users for comprehensive situational awareness. Furthermore, the flight interfaces must allow for fast and efficient pilot training.
- **Automation of aerial systems in cluttered environments:** PAVs will likely be autonomous for safety-critical phases of the flight, such as obstacle avoidance and landing spot selection for safe arrival and departure. Research will address collision avoidance with other traffic and swarming of vehicles along established routes such as highways to minimise the impact on urban areas.
- **Exploring the socio-technological environment:** PAVs will have a large impact on society, raising numerous questions concerning user expectations and interactions with new aerial transportation systems. It is important to engage in dialogue with experts, like regulators and stakeholders, and potential users of a PATS.

Group interviews for socio-technological evaluations

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Strategy

Research facilities

Within the project, state-of-the-art research facilities will be used. Unmanned aerial vehicles will serve as testbeds for the development of automation algorithms. Two ground-based simulators, the **CyberMotion Simulator** and the **HELIFLIGHT-R Flight Simulator**, will be used in experimental evaluations with humans in the loop.

In addition, we aim to implement aspects of our automation technologies and human-machine interface designs into the **Flying Helicopter Simulator**, a fly-by-wire / fly-by-light research helicopter operated by DLR.

Participants in simulators of the consortium

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Project milestones

The project has been broken down into distinct phases. In the **first year**, we will identify key socio-technological issues, experimental paradigms and automation requirements, thus laying a coherent foundation for subsequent research.

In the **second year**, initial tests will be performed with automation algorithms and evaluations with humans in the loop will be conducted on the experimental paradigms.

The **third year** will entail experiments on the human-machine interface and training issues, and will include simulations and tests that will be performed with automation in flight.

In the **final year**, results from exploration of the socio-technological environment will be summarised for public dissemination. In addition, part of the technological advancements will be implemented on the Flying Helicopter Simulator.